

Tributary Pollutant Sources To the Hells Canyon Complex (E.2.2-1)

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I. Introduction

In 1990, Idaho Power Company initiated studies to provide the research necessary to develop mitigation and enhancement measures regarding water quality as part of its relicensing of the Hells Canyon Complex. This report focuses primarily on tributary pollutant sources, particularly temperature and nutrients, to the Snake River from Swan Falls Dam to Hells Canyon Dam. It also includes a fundamental examination of the hydrology in the Hells Canyon Complex.

II. IPC Study Conclusions

1. "Water temperatures in tributaries of the HCC were consistently above Idaho and Oregon water quality criteria during summer months for the sampling period. Maximum temperatures never exceeded 30 °C and were generally about 25 °C." (Page 16, Paragraph 4)

Response: The BLM agrees with this statement.

2. "Flows in tributaries to the HCC were generally at or above average historic flows, representing near-average to moderately-high water yield in the HCC. The 1995 calendar year flow averaged 96% of historic flows while the 1999 calendar year flow averaged 122%. Flows in the Owyhee River were consistently below average, while those in the Malheur River more than doubled in 1999." (Page 16, Paragraph 5)

Response: The BLM agrees with this statement.

3. "The sum of all measured inflows closely matched the measured outflow. This finding indicates a good water balance: that is, little water was lost to or gained from unmeasured sources, including tributaries, drains, and groundwater." (Page 16, Paragraph 6)

Response: The BLM agrees with this finding.

4. *“The median total phosphorus concentrations in the Malheur (0.341 mg/L) and Boise (0.316 mg/L) rivers were at least twice the concentrations of most other sources. The median total phosphorus concentration in almost all sources of the HCC exceeded the recommended TMDL target of 0.070 mg/L. Median total phosphorus concentrations in Wildhorse River and Eagle Creek were at or below the recommended criterion of 0.042 mg/L for reference conditions in the Snake River Basin ecoregion. Similar to total phosphorus, orthophosphate concentrations in the Malheur and Boise rivers were at least two times higher than the concentrations in other sources, measuring about 0.230 mg/L.” (Page 16, Paragraph 7)*

Response: The BLM agrees with this finding.

5. *“The (OP: TP ...Orthophosphate: Total Phosphate... ratio percentage ranged from 33 to 77% and was highly variable by sample date. The mean Op:Tp ratio for all sources was significantly higher ($P=0.03$) in winter (November, December, January), suggesting algae use orthophosphate during the growing season.” (Page 17, Paragraph 1)*

Response: The BLM agrees with this finding.

6. *“The Malheur River and drains had a median nitrate concentration greater than 2.000 mg/L, or approximately 2 to 40 times greater than the concentration of most other sources. Ammonia concentrations were low, often near the detection limit. Similar to total phosphorus, Wildhorse River and Eagle Creek, as well as Pine Creek, had total nitrogen concentrations below the recommended criterion of 0.544 mg/L for reference conditions in the Snake River Basin ecoregion.” (Page 17, Paragraph 2)*

Response: The BLM agrees with this finding.

7. *“There does not appear to be a clear nutrient-limiting form. Tributary sources upstream of Brownlee Reservoir are mostly phosphorus limited, while those downstream are nitrogen limited.” (Page 17, Paragraph 3)*

Response: The BLM agrees with this conclusion. This is probably due to the anthropogenic activities that are different in the various watersheds sampled. In intensively farmed and urban watersheds, more fertilizer is being used and will produce a different loading than in those watersheds predominated by forest and range use activities.

8. *“The 1995 and 1999 orthophosphate load balances indicated considerable biological processing in the southwest Snake River upstream of Brownlee Reservoir. Substantial amounts of ammonia are apparently being transported from the deep waters of Brownlee Reservoir downstream.” (Page 17, Paragraph 4)*

Response: The BLM agrees with this conclusion. Figure 7 shows that ammonia levels coming from drains are as high as 1.0 mg/L. EPA laboratory experiments of relatively short duration have demonstrated that the lethal concentrations for a variety of fish

species are in the range of 0.2 to 2.0 mg/L NH₃ with trout being the most sensitive and common carp the most resistant. Levels below 0.2 may not be lethal but may exert an adverse physiological and histopathological effect (Meehan et al. 1991). The implication of ammonia being transported through the HCC is not explored further in this report but should be. The impact on salmonids and benthic communities below Hells Canyon Dam could be significant. The invertebrate report indicates a 17.6-mile-long depression in the benthic community below Hells Canyon Dam.

9. *“In 1995 and 1999, nutrient loads to the HCC during the growing season were generally similar, suggesting loads indicative of near-average to moderately-high water years, except for perhaps the Owyhee River. The Malheur River loads increased considerably between 1995 and 1999, probably because flows more than doubled.”* (Page 17, Paragraph 5)

Response: The BLM agrees with this finding.

10. *“The Snake River inflow to the study area and the Boise River contributed one-half of the total phosphorus and orthophosphate loads to the HCC, as measured between April 1999 and April 2000. The relative contribution of phosphorous from the tributaries generally decreased downstream, with the most noticeable decrease occurring to the Snake River downstream of Weiser, Idaho. A similar pattern was observed for nitrogen loads since the Snake River inflow to the study area contributed two-thirds of the nitrate load and nearly one-half of the ammonia load.”* (Page 17, Paragraph 6)

Response: The BLM agrees with this finding.

III. Study Adequacy

The study adequately documents the source and levels of pollutants entering the Hells Canyon Complex. The biological ramifications are not explored in this document. The facts presented by the applicant correlate with findings of earlier researchers.

IV. BLM Conclusions and Recommendations

Conclusions

1. The BLM should accept the findings of this report.
2. The ramifications of the findings concerning impacts on the aquatic communities need greater explanation. BLM recreation and aquatic resource values are being impacted by the poor water quality in Brownlee Reservoir. This report provides information on the sources of the problem but does not recommend potential solutions.

Recommendations

1. The impact of ammonia being generated in Brownlee Reservoir's deep water areas and passed downstream could have serious impacts on salmonids and benthic communities in the Hells Canyon Reach.
2. This report must be correlated with the water quality reports for the Hells Canyon Reach to determine what concentrations of ammonia are present and the potential impacts.

3. Using the TMDL process Applicant should develop in cooperation with state and federal water quality regulatory agencies a water quality improvement plan for the Hells Canyon Complex.
4. The BLM should work with the other agencies to correlate the pollutant source study with the various biological study results. The linkages are not clearly presented in this study.